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United States, Volume 1: National Sediment Inventory,'' Office of Science and Technology, September 1997, EPA–823–R–97–006.) The contaminants of interest are those that preferentially partition to sediments, become sequestered, and remain bioavailable to the aquatic community. SQC are intended to protect against chronic effects to benthic organisms resulting from sediment contamination. The development and implementation of SQC is intended primarily to enable development of pollutant-specific State standards and NPDES permit limits needed for implementation of a more effective source control program. In addition, SQC will be useful in other programs, such as developing clean-up levels for sediment remediation activities and in evaluating sediments dredged from the Nation's waterways.

Sediment quality criteria have been proposed for five non-ionic organic compounds: acenapthene, dieldrin, endrin, fluoranthene, and phenanthrene. See, Technical Basis for Deriving Sediment Quality Criteria for Nonionic Organic Contaminants for the Protection of Benthic Organisms by Using Equilibrium Partitioning (EPA–822–R–93–011); Acenapthene (EPA–822–R–93–013); Dieldrin (EPA–822–R–93–015); Endrin (EPA–822–R–93–016); Fluoranthene (EPA–822–R–93–012); Phenanthrene (EPA–822–R–93–014). In addition to non-ionic organic compounds, the Agency also is working to develop SQC for metals. After considering public comments, EPA intends to publish final SQC dieldrin and aldrin in final form. The proposed criteria for acenapthene, fluoranthene, and phenanthrene will not go final; instead, EPA plans to propose a total PAH sediment criterion. In addition to its work on SQC, the Agency also is working to develop standardized methods for performing chronic sediment bioassay tests.

The EPA Science Advisory Board subcommittee reviewing SQC for non-ionic organics concluded that: ''these criteria not be used as stand-alone, pass-fail values for all applications.'' (EPA–SAB–EPEC–93–002). EPA is developing a users manual to provide guidance on use of SQC in a regulatory context to ensure consistency with that recommendation. The guidance would recommend that SQC be used in conjunction with chronic sediment bioassay tests in determining compliance with State standards, such as in interpreting the narrative criterion of no toxics in toxic amounts. Such an approach is currently being developed in more detail, and the users guidance will be made available to the public for comment prior to being finalized.

Request for Comment on Sediment Quality Criteria

EPA seeks public comment on the following questions:

1. Should the current regulation be revised to specifically address sediment quality criteria, and if so, what should such revisions address?

2. What chemicals or classes of compounds should receive priority for development of SQC?

11. Biological Criteria

Biological Integrity, Assessments and Criteria '

The Clean Water Act directs EPA to work with States and Tribes to restore and maintain the biological integrity of the Nation's surface waters (CWA 101(a), 303, 518(e)). Biological integrity is defined as a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of the natural habitat of a region (Karr and Dudley, EPA–440/5–90–004, 1981). Biological integrity does not necessarily represent an aquatic system untouched by human influence, but does represent one that is balanced, adaptive and reflects natural evolutionary processes. Designated uses and criteria to protect those uses in State and Tribal water quality standards programs provide the means to achieve biological integrity.

To more fully protect aquatic resources and provide more comprehensive assessments of aquatic life use attainment, it is EPA's policy that States and Tribes should designate aquatic life uses for their waters that appropriately address biological integrity and adopt biological criteria necessary to protect those uses (EPA–823–B–93–002, Office of Water Memorandum to EPA Regions, Policy on Bioassessment and Biological Criteria, 1991). Designated uses to support aquatic life can cover a broad range, or continuum, of biological conditions with some waters being closer to the ideal of biological integrity than others. The attainable levels of biological integrity for any water is a State and/or Tribal determination involving public participation.

For example, the State of Maine used the water quality classification law to establish the minimum standards for three levels of biological integrity. These levels correspond to the water quality classification system and are increasingly restrictive, proceeding from the minimum state standard, Class C, to Class A, the most protective standard. These refinements serve to explicitly specify the designated aquatic life uses that apply to each classification category. Class C requires that the structure and function of the biological community be maintained and provides for the support of all indigenous fish species. The intermediate standard of Class B requires that there be no detrimental changes to the aquatic community, that all indigenous species are supported and that habitat be unimpaired. The Class A standard requires that aquatic life be ''as naturally occurs'' and habitat be characterized as ''natural.'' Within Class A, there is even a subset, Class AA, that further specifies ''free-flowing'' habitat. Waters with the Class AA designation are protected from any additional discharge or alteration. Under this system, attainment of the aquatic life classification standards for a given water body is evaluated using numeric biological criteria that were statistically derived from a statewide database. The numeric biological criteria are slated to go to rule-making in 1998.

Biological assessments are used to evaluate the condition of a water body using direct measurements of the resident biota in surface waters. Biological assessments integrate the cumulative impacts of chemical, physical, and biological stressors on aquatic life. Biological criteria, derived from biological assessment information, can be used to define State and Tribal water quality goals for aquatic life by directly characterizing the desired biological condition for an aquatic life use designation. Biological criteria are narrative descriptions or numerical values that describe the reference condition of the aquatic biota inhabiting waters of a specific designated aquatic life use (EPA–440/5–90–004). Biological criteria are based on integrated measures, or indices, of the composition, diversity, and functional organization of a reference aquatic community. The reference condition describes the attainable biological conditions for water body segments with common characteristics within the same biogeographic region. In summary, biological criteria provide a direct measure of the desired condition of the aquatic biota. This capability serves a dual purpose—goal setting and environmental impact analysis. Biological assessments are then conducted to evaluate if a water body is attaining its designated aquatic life use.

Biological criteria can play an important role in water quality programs and when properly implemented, complement and support

other methods and criteria, such as chemical water quality criteria and whole effluent toxicity criteria. The latter are measures, or indicators, of environmental stress and exposure whereas the biological assessments and criteria measure the cumulative effects of stressors on the aquatic community, whether chemical, physical or biological stressors, singly or in combination. A water quality program that employs the full array of methods and criteria will develop the information needed for more accurate assessment of impairment and effective resource management.

The linkage of biological effects, stressor identification and exposure assessment is particularly important when there are multiple stressors impacting a water body, especially when a watershed management approach is taken, or where wet weather flows are a major source of impairment in the water body. A comprehensive water quality program with biological, chemical, toxicity, and physical components will enable States and Tribes to make better decisions and focus limited resources to maximize environmental gain. A critical issue facing EPA's National Water Program is the manner and extent to which biological assessments and criteria should be incorporated into water quality programs to transition to a more comprehensive water quality control program that will better identify impairments and track improvements. This includes integrating biological assessments and criteria into use designations and attainability analyses, watershed management strategies and source control requirements.

Biological criteria typically include measures of the types, abundance, and condition of aquatic plants and animals, providing information on the status and function of the aquatic community in response to the cumulative impact of both chemical and nonchemical stressors. For example, Ohio uses a multi metric approach to develop numeric biological criteria for two different assemblages: benthic macro invertebrates (bottom dwelling insects, etc.) and fish (Yoder, 1995). Biological indices have been derived that integrate measurable structural and functional characteristics of the in-stream fish and macro invertebrate communities which help assess the health of the community. Structural characteristics are based on measures of biological community structure such as diversity or taxa richness (e.g. total number of taxonomic groups) and the representation of specific taxonomic groups (e.g. number of mayfly or caddisfly taxonomic groups) within the community. Functional characteristics include measures of biological function such as feeding strategy (e.g. percent carnivores, omnivores), environmental tolerance (e.g. number of intolerant and tolerant species), and disease symptoms (e.g. percent diseased species and anomalies, including deformities, eroded fins, lesions and external tumors in fish).

The Ohio biological criteria were developed based on ecoregional reference conditions and provide a quantitative biological description of the State's designated aquatic life uses for warm water rivers and streams, including exceptional, general, modified and limited warm water habitat. The description and derivation of the indices and ecoregions are contained in the ''Biological Criteria for the Protection of Aquatic Life: Volume II. Users Manual for Biological Field Assessment of Ohio Surface Waters'' cited in Ohio's Water Quality Standards. Ohio uses biological criteria to support all aspects of its water quality management program (Yoder, 1995). Ohio's approach is another example of how a State can adopt biologically-based refined designated aquatic life uses and biological criteria consistent with EPA's policy.

Application of Biological Assessments and Criteria in State and Tribal Water Programs

Biological assessments and criteria can be an important component of State and Tribal watershed management programs by assisting in prioritization and targeting of actions, setting restoration goals and performance standards, and documenting results. For example, North Carolina has adopted narrative biological criteria into its water quality standards regulation that references standardized methods for data collection and analysis for fish and macro invertebrate communities. Specific biological indices, metrics, or numeric criteria are not included in the water quality standards regulation. However, by citing the standardized methods in the State's water quality standards, North Carolina established a mechanism for consistent, quantitative translation of the narrative biological criteria. Under the State's five year basin-wide management program, benthic macro invertebrate and fish community data are presented in individual basin-wide assessment reports. Macroinvertebrate and fish community surveys, special studies, and other water quality sampling activities are conducted in the second and third years of the cycle to provide information for assessing status and trends through the basin. Water quality management plans are being developed for all of the State's major river basins on five year cycles.

Biological assessments and criteria can fulfill several assessment functions within the NPDES permitting process. In conjunction with pollutant concentration and toxicity data, biological assessments can be used to detect previously undetected chemical water quality problems and to evaluate the effectiveness of control actions. Biological findings of use impairment can trigger the necessary technical investigations which can identify the source or sources of impairment and determine appropriate corrective measures through point or nonpoint source controls as appropriate. The State of Maine uses biological assessments and criteria to evaluate the effectiveness of controls and to inform the permit review process. Aquatic life criteria are specified in the water quality classification law and attainment is assessed using quantitative data and a multi variate statistical model. Findings of biological impairment trigger management intervention to identify possible causes. Permits have been modified and enforcement actions initiated to address biological impacts. Alternatively, favorable biological findings have been used in a tiered approach to re-direct limited agency and permittee resources to more urgent concerns.

In Maryland, investigators use bioassessments as an integral part of the Rapid Stream Assessment Technique (RSAT) to conduct watershed-wide stream quality reconnaissance, rapid screening of general storm water BMP performance and for elucidating general watershed land use—stream quality relationships (Galli, J., 1997). In Michigan, biological assessments have been used in the Wayne County Rouge River National Wet Weather Demonstration Project to identify impacts and to guide decision-makers and the public in evaluating options for preventing, reducing and minimizing pollution loading impacts on the river under a watershed approach to wet weather pollution management (Cave, 1997).

Biological assessments and criteria can be useful in evaluating highly variable or diffuse sources of pollution such as storm water runoff. These types of point source pollution do not lend themselves well to traditional chemical water quality monitoring and a biological assessment of their cumulative impact may effectively evaluate these discharges and the success of control actions.

Bioassessments have been successfully used in Florida to assess the cumulative impacts of multiple pollution sources within a watershed, in particular, storm water runoff and other nonpoint source discharges (McCarron, Livingston and Frydenborg, 1997). The Florida Storm water/Nonpoint Source Bioassessment Projects have found that bioassessments, over time, help reflect impacts from the fluctuating environmental conditions and highly variable pollutant inputs of wet weather discharges. Bioassessments also help to evaluate the habitat degradation typically associated with Storm water discharges. Bioassessments were also identified by key storm water experts from across the Nation as an important environmental indicator tool for assessing the impacts of storm water runoff and the effectiveness of storm water management strategies (Claytor and Brown, 1996).

When attempting to identify the specific sources of use impairment (stressors), the role that biological assessments and criteria will play needs to be carefully defined. Stressor identifications based solely on biological information may be straightforward in certain water bodies where a single source is the cause of impairment. In these cases, paired bioassessments, conducted above and below the discharge point, or in the vicinity of the source, may readily identify the degree of impairment and the efficacy of chosen control strategies. In small urban watersheds, dominated by storm water runoff, bioassessments and criteria may provide a direct means to measure and control the storm water impacts.

However, in complex water bodies, where numerous sources contribute to the observed biological impairment, it may be difficult for bioassessments to distinguish the relative degrees of impairment from each contributing source. Given these situations, EPA anticipates that a stressor identification evaluation (SIE) procedure will need to be developed to provide the technical tools and information that watershed managers can use to identify and evaluate the different sources of impairment that the bioassessments reveal and the specific stressors associated with each source (e.g. flow, turbidity, temperature, metals, etc.).

Guidance on Development of Biological Criteria

EPA has developed and will continue to develop technical guidance on conducting bioassessments and developing biological criteria for the following specific water body types: streams and wadable rivers, lakes and reservoirs, estuaries and near coastal waters, wetlands and large rivers. Technical guidance for streams and small rivers biological assessments and criteria was published in 1996 (EPA 822–B–96–001). Publication of technical guidance on lakes and reservoirs is expected in 1998 followed by guidance on estuaries and near coastal waters by 1999. Technical guidance development for wetlands was initiated in 1997 and for large rivers in 1998. Completion of these documents is planned within 5 years.

Guidance on Implementation of Biological Criteria

EPA is currently considering how to best advance State and Tribal adoption and implementation of biological criteria. A draft discussion document on implementation of biological criteria by States and Tribes sets forth an iterative, step-wise approach to development of biological criteria and adoption in State and Tribal water quality standards. (draft guidance document on biological criteria implementation, EPA, March 1998) Elements of a stepwise approach could include:

(1) establishment of a long term goal to restore and maintain biological integrity of State or Tribal surface waters where determined feasible;

(2) implementation plan for development of biological criteria for specific water body types, including time frame;

(3) development of standardized biological assessment methods, regional reference conditions, and biological database to support refinement of designated aquatic life uses and development of biological criteria;

(4) adoption of narrative biological criteria into water quality standards;

(5) adoption of quantitatively-based biological criteria in water quality standards.

In developing a flexible, stepwise approach, EPA is evaluating options for adoption of biological criteria that would result in the consistent translation of narrative biological criteria into numeric criteria (e.g. quantitatively-based biological criteria). A quantitatively-based biological criteria could be defined as:

(1) A narrative statement adopted into State or Tribal water quality standards that describes specific designated aquatic life uses and cites technical procedures existing outside of regulation. The technical procedures result in the translation of the narrative statement into quantitative measures; including description of how biological assessment data is collected and analyzed, and how the biological criteria are developed.

—and/or—

(2) A narrative statement as above plus the adoption of the technical procedures or the actual numeric biological criteria in State or Tribal water quality standards.

These two options for adopting quantitatively-based biological criteria are based on existing State models such as Maine, North Carolina and Ohio (EPA 230–R–96–007). North Carolina has adopted a narrative biological criteria for its aquatic life use classification and cites in the water quality standard regulation the standardized methods for data collection and analysis. Maine and Ohio have developed more refined classifications of their aquatic life uses and developed biological criteria for each specific use. Both States cite technical manuals specifying standardized methods. Ohio has adopted its numeric biological criteria directly into its standards regulation. As mentioned earlier, the Maine Department of Environmental Protection is currently embarking on a rule making process to adopt its existing standardized field methods, statistical analysis protocols and numeric classification criterion (numeric biological criteria) into its water quality regulation. Similar to Ohio, these rules will codify the technical procedures for determining attainment of aquatic life use classification. EPA describes these various States' work for consideration as possible models of biological criteria that would result in the consistent translation of narrative biological criteria into numeric criteria (e.g. quantitatively-based biological criteria).

A Regulatory Requirement for Biological Criteria

EPA is considering whether it should explicitly require States and Tribes to adopt biological criteria in either the narrative or numeric form, and, if not, whether an alternative approach to encouraging the use of biological criteria is appropriate. Some States and Tribes have already allocated resources to biological criteria development because a regulatory requirement is anticipated at some time in the future. Others have been unwilling to commit resources to development of biological criteria before specifically required to do so. Concerns have also been raised about yet another regulatory requirement to be imposed over existing requirements that are still not fully implemented—adding new layers of requirements in a piecemeal fashion without adequate resources. EPA is sensitive to the concern that

generating the data and developing the analytical capacity to incorporate biological criteria into water quality standards may present a significant resource challenge to some States and Tribes.

Advocates for a requirement for States and authorized Tribes to adopt biological criteria argue that States and Tribes will not implement biological criteria in a timely manner, if at all, without an explicit Federal regulatory requirement. The viewpoint has been expressed that States and authorized Tribes will not adequately increase program emphasis or resources if biological criteria are not required and, as a consequence, biological criteria will be relegated to a lesser role then chemical water quality criteria or whole effluent toxicity. Some States have either direct (i.e. executive orders, legislative mandates) or indirect limitations on adopting new regulations and policies that are more stringent than that required by Federal legislation. Adopting biological criteria may be seen in some States and Tribes as exceeding minimum Federal requirements. Concern has been expressed that without biological criteria as a fundamental component of a State or Tribal water quality standards program, transition of water quality standards programs to a more integrated ecosystem approach with an emphasis on watersheds will not succeed.

Adoption of Narrative Biological Criteria

As an alternative to requiring adoption of numeric biological criteria, EPA could require States and Tribes to adopt a narrative biological criteria. The narrative biological criteria could be a statement of intent adopted in a State's or Tribe's water quality standards to formally consider the fate and status of aquatic biological communities and to establish the framework for the consistent and quantitative translation of a State's or Tribe's designated aquatic life uses and development of numeric biological criteria. EPA has published a document on procedures for initiating narrative biological criteria (EPA–822–B–92–002). An example of a narrative biological criteria based upon that publication follows:

> The State will preserve, protect, and restore the water resources in their most natural condition deemed attainable. The condition of these water bodies shall be determined from the measures of physical, chemical, and biological characteristics of each surface water body type, according to its designated use. As a component of these measurements, the biological quality of any given water system shall be assessed by comparison to a reference condition(s) based upon similar regional hydrologic and watershed characteristics (reference standardized methods and operating protocols).
>
> Where attainable, such reference conditions or reaches of water courses shall be those observed to support the variety and abundance of aquatic life in the region as is expected to be or has been historically found in natural settings essentially undisturbed or minimally disturbed by human impacts, development or discharges. This condition shall be determined by consistent sampling and reliable measures of selected indicated communities of flora and/or fauna as established by [cite appropriate State agency or agencies] and may be used in conjunction with acceptable chemical, physical, and microbial water quality measurements and records judged to be appropriate to this purpose.
>
> Regulations and other management efforts relative to these criteria shall be consistent with the objective of preserving, protecting and restoring the most natural communities of fish, shellfish, and wildlife attainable in these waters; and shall protect against degradation of the highest existing or subsequently attained uses or biological conditions pursuant to State antidegradation requirement.

EPA is considering what could constitute approvable narrative biological criteria and the feasibility of EPA promulgating narrative biological criteria where a State or Tribe fails to adopt such criteria.

Time Frame for Adoption of Biological Criteria in State and Tribal Water Quality Standards

In 1991 EPA issued a policy that established as a long-term Agency goal the development and adoption of biological criteria in State and Tribal water quality programs (Transmittal of Final Policy on Biological Assessments and Criteria, memorandum from Tudor Davies, Director of the EPA Office of Science and Technology, to Regional Water Management Division Directors, June, 1991). EPA has identified as a program priority during the FY1997–1999 Water Quality Standards Triennium that States and Tribes initiate and continue to expand development of scientifically defensible biological-based classification systems (FY 1997–1999 Water Quality Standards Priorities, memorandum from Tudor Davies, Director of the EPA Office of Science and Technology, July 22, 1996). Based on State experiences, development of biological criteria can range between five to ten years, depending on several factors such as available resources, existing State expertise, existing data bases and geographic variability. If EPA were to require or recommend that States and Tribes adopt biological criteria, EPA would need to determine appropriate time frames for adoption and implementation of these criteria. EPA is considering whether the following are reasonable and appropriate time frames for adoption of biological criteria in State and Tribal water quality programs:

1. narrative biological criteria for streams and an implementation plan for development of quantitatively-based biological criteria for streams in the 2000–2003 Water Quality Standards Triennium.

2. narrative biological criteria and an implementation plan for development of quantitatively-based biological criteria for other applicable water body types (e.g. lakes and reservoirs, estuaries and near coastal waters, large rivers and wetlands) within ten years following EPA publication of technical guidance.

Linkage of Biological Criteria to Stressor-Identification

One of the potential benefits of developing a biological criteria program is the increased ability to assess water quality impairment due to nonpoint source pollution, broadening the scope of most water quality-based programs beyond regulation of effluent discharges. However, many currently regulated point source dischargers are skeptical that greater focus on nonpoint source would actually occur, particularly considering the time and resource constraints on most State and Tribal programs. Industry and municipalities are concerned that biological criteria bring an additional layer of regulatory and associated costs and that they may be an easy target for additional requirements whether their discharge is the source of impairment or not. EPA recognizes that the role biological assessments and criteria will play to help identify specific stressors or sources of use impairment will need to be carefully defined and is interested in practical, effective approaches to evaluate potential stressors and sources of impairment when a water body fails biological criteria.

Request for Comment on Biological Criteria, Assessment and Implementation

EPA is soliciting comment on the following questions:

1. Should EPA amend the regulation to explicitly require States and Tribes to adopt biological criteria or are there alternative approaches that EPA should consider? Should EPA seek to ensure that biological criteria will be developed and implemented in all State and Tribal water quality programs?

2. If EPA were to explicitly require States and Tribes to adopt biological

criteria, should it require a narrative only, or a combination of both narrative and numeric criteria as described in the draft implementation guidance (e.g quantitatively-based biological criteria)? What should EPA promulgate if a State or Tribe fails to adopt biological criteria in its water quality standards?

3. If EPA were to explicitly require biological criteria, what is a reasonable time frame for State or Tribal adoption?

4. What are practical, effective approaches to identify and evaluate potential stressors and sources of impairment when a water body fails biological criteria?

5. In what ways can biological criteria and biological assessments be used to effectively manage known stressors or sources of impairment, including urban and rural runoff?

12. Wildlife Criteria

Wildlife criteria are designed to protect mammals and birds from adverse impacts from pollutants due to consumption of food or water from a water body. A wildlife criteria methodology applicable to the Great Lakes Basin and a few wildlife criteria were published as part of the Great Lakes Guidance. EPA does not have an active wildlife criteria guidance program at this time but it is a potential emerging criteria program. The wildlife criteria that EPA promulgated in the Great Lakes Guidance are for the following four chemicals: DDT (and metabolites), mercury, PCBs, and dioxin (2,3,7,8–TCDD).

Request for Comment on Wildlife Criteria

EPA requests comment on the following question:

1. Does the regulation need to be clarified to specifically address the development of wildlife criteria guidance for the protection of aquatic dependent wildlife?

13. Physical Criteria

Physical criteria is a concept that takes into account the physical attributes of the aquatic environment, such as quality of habitat and hydrologic balance. Commenters on the draft ANPRM identified physical habitat and hydrologic balance criteria as additional important forms of criteria that should be discussed in the ANPRM. EPA agrees that physical habitat parameters, including flow, are important and often overlooked parameters that influence and at some sites control whether or not an aquatic life use is or will be attained. For example, research referenced by Schueler (see Schueler, T. The Importance of Imperviousness. Watershed Protection Techniques, Fall 1994) suggests that in many small urban streams substantial loadings from municipal separate storm sewer systems are severely degrading the aquatic habitat. The authors suggest that the primary cause of this habitat impairment is the high volume and velocity of the storm water flows into this type of stream. The high flows exceed the peaks in the natural flow regime of these streams and as a result stream bank erosion, turbidity and siltation occur and the local habitat is degraded. Further habitat destruction in larger downstream receiving waters often results from the physical deterioration of the upstream urban systems. For example, some recent studies have shown that in some lakes the biggest source of silt and sediment deposition into the lake is actually from the eroded material that comes directly out of the stream bed and stream banks that are scoured out during elevated wet weather peak discharges and extended hydrographs. This can lead to eutrophication, increased turbidity, decreased light penetration, submerged aquatic vegetation (SAV) loss, spawning bed smothering, and shellfish habitat damage.

Studies of this phenomenon suggest that until these man-made flow regimes are better managed and the resulting stresses to physical habitat corrected, no amount of control of pollutants is likely to restore the aquatic ecosystem to a level more closely resembling a natural state.

The character of natural waters is obviously affected by wet weather events. Flowing waters, especially, can change dramatically with the seasons and in response to specific precipitation events. Seasonal and event driven changes in flows, sediment loads, temperature, etc. are common and natural processes which are integral to the maintenance of natural waters and their aquatic communities. Human-caused changes to the landscape, however, have altered these natural processes, and for many waters, the altered flows and the contamination now associated with wet weather discharges (discharges that occur in whole or in part as the result of wet weather events) present significant environmental problems. Although these problems are generally well recognized, they have been difficult to address effectively precisely because of their magnitude and variable nature.

The CWA's objectives include the protection and restoration of the physical integrity of our nation's waters. Scientific experts agree that overall physical habitat loss is the single biggest factor in the loss of aquatic species. Physical habitat damage and loss to the nation's waters includes: (1) Wetlands losses; (2) the denuding of stream banks through unwise forestry, farming, mining, and urbanization; (3) the embedding of stream bottoms with fine-grained silt from poorly designed and managed farm and construction sites; (4) the damming of river systems; (5) the channelization and/or concrete lining of rivers and streams; (6) the obliteration of ephemeral and first-order streams and springs during urbanization and; (7) the widening and deepening of stream channels due to high-velocity urban storm flows.

All seven of these phenomena are common forms of aquatic habitat damage and loss, and yet there is little national guidance to address the physical parameters that contribute to these impacts. In addition, EPA does not have a clear picture of how often physical habitat parameters, including flow are used by States and Tribes to assess, manage, and/or regulate activities that damage habitat. Some commenters on the draft asserted that water quality criteria guidance is needed to address these forms of habitat loss, to create threshold values to protect designated uses and to provide measuring tools for monitoring watershed and water body health. EPA agrees that further investigation of the role of physical habitat parameters, including hydrologic balance, in water quality standards programs is necessary. EPA is considering the relative importance of such criteria guidance as compared to other forms of criteria guidance such as ambient water quality criteria, sediment criteria and biological criteria; and on the likelihood that States and Tribes would develop and implement such criteria if technical guidance and supporting policy were available. EPA is also interested in identifying examples of where such criteria guidance has already been used as the basis for assessing, managing and protecting water quality.

With respect to hydrologic balance, EPA discusses the issue in the antidegradation section of this ANPRM. Some commenters on the draft ANPRM suggested that maintaining hydrologic balance in surface waters, though important in the context of antidegradation, is also important for other aspects of water quality standards. These commenters suggested that hydrologic balance should be part of basic water quality criteria guidance for watershed and water body assessment and for long-term urban storm water abatement and prevention plans under